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CA 2220627 C 2004/01/20

(11)(21) 2 220 627

(12) BREVET CANADIEN  
CANADIAN PATENT

(13) C

(22) Date de dépôt/Filing Date: 1997/11/03

(41) Mise à la disp. pub./Open to Public Insp.: 1999/05/03

(45) Date de délivrance/Issue Date: 2004/01/20

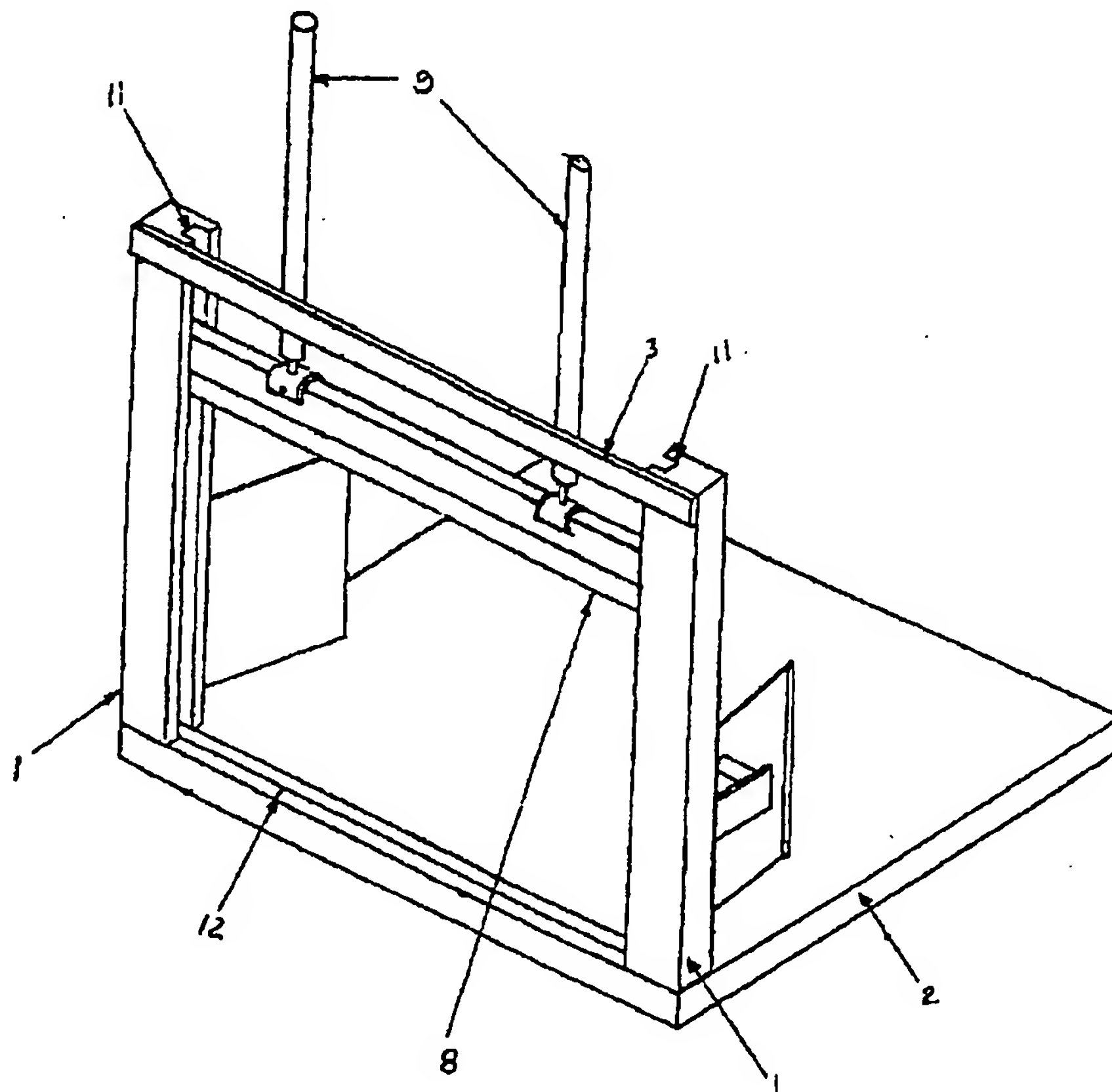
(51) Cl.Int.<sup>6</sup>/Int.Cl.<sup>6</sup> B26D 7/01

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(54) Title: LARGE SQUARE BALE CUTTER



(57) Abrégé/Abstract:

A device for cutting large square bales of crop material into smaller pieces for processing, comprising means for applying a compacting force to a portion of the bale to prevent deformation during cutting, a knife blade approximately as long as the bale, the blade having a flat side facing the compacted portion of the bale and a beveled side facing the uncompacted portion of the

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**(57) Abrégé(suite)/Abstract(continued):**

bale, the blade being mounted above the bale parallel to the axis of compaction and the strings on the bale, and means to force the knife blade down and through the bale.

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## **LARGE SQUARE BALE CUTTER**

This invention deals with the field of handling, processing and transporting agricultural products and in particular with the processing of baled hay for transport and a cutter for use therein.

### **BACKGROUND:**

There is considerable demand for hay in the Orient to be used for livestock feed. Transportation is usually in containers which have a maximum weight limit. The freight charged is based on the container, regardless of its weight, and so to minimize freight charges the container must be loaded to the maximum weight allowable. In order to reach this maximum weight, hay must be compacted to a certain density. The density of common small square bales is sufficient for export however these small bales require considerable handling and are inconvenient for large scale operations. In order to be attractive to large scale operations, a system must provide for the use of balers that make large bales in the field.

Recently balers which make large square bales, rather than large cylindrical bales, have become available. While the density of these large square bales is not sufficient for loading directly into containers, they are convenient and economical to handle and transport to the export packaging facilities where they may be further compacted to the required density and loaded into the containers.

This further compaction process requires that the large square bales be cut into smaller pieces which are then compacted to the required density. Various methods are presently used to cut the bales including chain saw type blades, sickle blades and band-saw blades, all of which work but all of which are costly to maintain and are somewhat hazardous because of the heat generated by the high blade speeds required, which can cause fires in the dry hay.

**SUMMARY OF THE INVENTION**

It is the object of the present invention to provide a device for cutting bales of crop material which are known in agriculture as large square bales, which is fast, safe to operate and has low maintenance costs.

The invention accomplishes this object providing a device for cutting bales of crop material which are known in agriculture as large square bales, and which bales are compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the invention comprising means to apply pressure to compact at least a portion of the bale, the compacted portion, along the compaction axis; a blade approximately as long as the bale, having a flat side and a bevelled side, mounted above the uncompacted portion of the bale in proximity to the division between the compacted portion and the uncompacted portion, with the cutting edge pointed generally down and parallel to the compaction axis, the flat side of the blade being towards the compacted portion of the bale, and the bevelled side towards the uncompacted portion of the bale; and means to force the blade down and through the bale.

In a first aspect the present invention provides a device for cutting bales of crop material which are known in agriculture as large square bales, said bales being compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the device comprising:

means to apply pressure to compact at least a portion of the bale;

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a blade approximately as long as the bale, said blade having a flat side and a bevelled side, said blade mounted with a cutting edge pointed generally parallel to the compaction axis, the flat side of the blade being towards the compacted portion of the bale and the bevelled side towards the uncompact portion of the bale; and

means to force the blade through the bale.

In a second aspect, the present invention provides a device for cutting bales of crop material which are known in agriculture as large square bales, said bales being compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the device comprising:

a flat platform with a pair of parallel members perpendicular to the platform, said platform being of a size sufficient to accommodate a large square bale between the perpendicular members;

a blade, having a flat side and a bevelled side which meet at a cutting edge, said blade being slidably mounted on the members so that the cutting edge may move towards the platform; and

means to force the blade through the bale to meet the platform.

**DESCRIPTION OF THE DRAWINGS**

While the invention is claimed in the concluding portions

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hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labelled with like numbers, and where:

Figure 1 is a perspective view of the embodiment with the blade in the raised position;

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Figure 2 is a perspective view of the embodiment with the blade in the lowered position;

Figure 3 is a plane top view of the embodiment;

Figure 4 is a plane front view of the embodiment; and

Figure 5 is a cross-sectional view of the blade of the embodiment.

**DETAILED DESCRIPTION OF THE INVENTION:**

The invention provides a device for cutting bales of crop material which are known in agriculture as large square bales, and which bales are compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the invention comprising means to apply pressure to compact at least a portion of the bale, the compacted portion, along the compaction axis; a blade approximately as long as the bale, having a flat side and a beveled side, mounted above the uncompacted portion of the bale in proximity to the division between the compacted portion and the uncompacted portion, with the cutting edge pointed generally down and parallel to the compaction axis, the flat side of the blade being towards the compacted portion of the bale, and the beveled side towards the uncompacted portion of the bale; and means to force the blade down and through the bale.

In one embodiment the invention provides a device for cutting bales of crop material which are known in agriculture as large square bales, and which bales are compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the invention comprising a flat platform with a pair of perpendicular members on opposing sides thereof, the platform being of a size sufficient to accommodate a large square bale between the members; a blade, having a flat side and a beveled side which meet at a cutting edge,

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the blade being slidably mounted on the perpendicular members so that the blade is generally parallel to the plane of the platform and so that the cutting edge may move towards the platform; means to apply compaction pressure to that portion of a bale that is adjacent to the path of the flat side of the blade, in a direction that is generally parallel to the blade; means to move the blade through the bale to meet the platform.

Figure 1 shows a preferred embodiment of the invention. Knife support members 1 are attached, by welding or similar conventional means, at one edge of a bale bed 2. Cross member 3 is similarly attached to the upper ends 4 of the knife support members 1. Knife 5 has a flat side 6 and a beveled side 7 meeting at a cutting edge 8, and is mounted on cutting hydraulic cylinders 9 by means of clevises 10 so as to be slidably engaged in guide channels 11. Cutting channel 12 accommodates the knife cutting edge 8 when the knife 5 is in the lowered position 13. Pressure plates 14 swivel from a released position 15 to a compacting position 16, the pressure plates 14 being mounted by hinges 17 on swivel support members 18 vertically attached, by welding or similar conventional means, to the bale bed 2. The swiveling motion of the pressure plates 14 is in response to actuation of swivel hydraulic cylinders 19 which are pivotally attached to cylinder flanges 20 extending from knife support members 1.

In operation, a bale 21 is placed on the bale bed 2 so that the knife 5 is above the bale 21 and between and approximately parallel to the bale strings 22. The pressure plates 14 are swivelled into compacting position 16 by the extension of swivel hydraulic cylinders 19 in which position the plates 14 prevent the bale 21 from being squashed and deformed by the knife 5. Cutting hydraulic cylinders 9 are extended forcing the cutting edge 8 of the knife 5 down through the bale 21 and into cutting channel 12, thereby cutting off a portion of the bale 21, which can be transported away for further processing. During the downward stroke of the knife 5, the flat side 6 of the knife 5 slides smoothly down the cut face of the bale 21, while the beveled side 7 of the knife 5 moves the cut off portion of the bale 21 outward and away from the knife 5.



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Thus it can be seen that the invention accomplishes all of its stated objectives. The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous changes and modifications will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all such suitable changes or modifications in structure or operation which may be resorted to are intended to fall within the scope of the claimed invention.

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What is claimed is:

1. A device for cutting bales of crop material which are known in agriculture as large square bales, said bales being compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the device comprising:

means to apply pressure to compact at least a portion of the bale;

a blade approximately as long as the bale, said blade having a flat side and a bevelled side, said blade mounted with a cutting edge pointed generally parallel to the compaction axis, the flat side of the blade being towards the compacted portion of the bale and the bevelled side towards the uncompacted portion of the bale; and

means to force the blade through the bale.

2. A device for cutting bales of crop material which are known in agriculture as large square bales, said bales being compacted along a compaction axis and held in compaction by strings wrapped around the bale approximately parallel to the compaction axis and tied, the device comprising:

a flat platform with a pair of parallel members perpendicular to the platform, said platform being of a size sufficient to accommodate a large square bale between the perpendicular members;

a blade, having a flat side and a bevelled side which meet at a cutting edge, said blade being slidably mounted on the members so that the cutting edge may move towards the platform; and

means to force the blade through the bale to meet the platform.

3. The device of claim 2 wherein the blade is parallel to the compaction axis of the bale.

4. The device of claim 3 wherein each end of the blade is engaged by a channel on each perpendicular member.

5. The device of claim 4 wherein the means to apply pressure to the bale are hydraulically actuated plates, said plates being generally perpendicular to the plane of the platform.

6. The device of claim 5 wherein the plates are hingably attached at one perpendicular edge to a second pair of perpendicular members.

7. The device of claim 5 wherein the means to move the blade is at least one hydraulic cylinder.

8. The device of claim 7 wherein the means to move the blade is a pair of hydraulic cylinders mounted on a cross member extending between the ends of the perpendicular members opposite the platform, the hydraulic cylinders having piston rods attached to the blade by clevises or other conventional means.

Application for Letters Patent

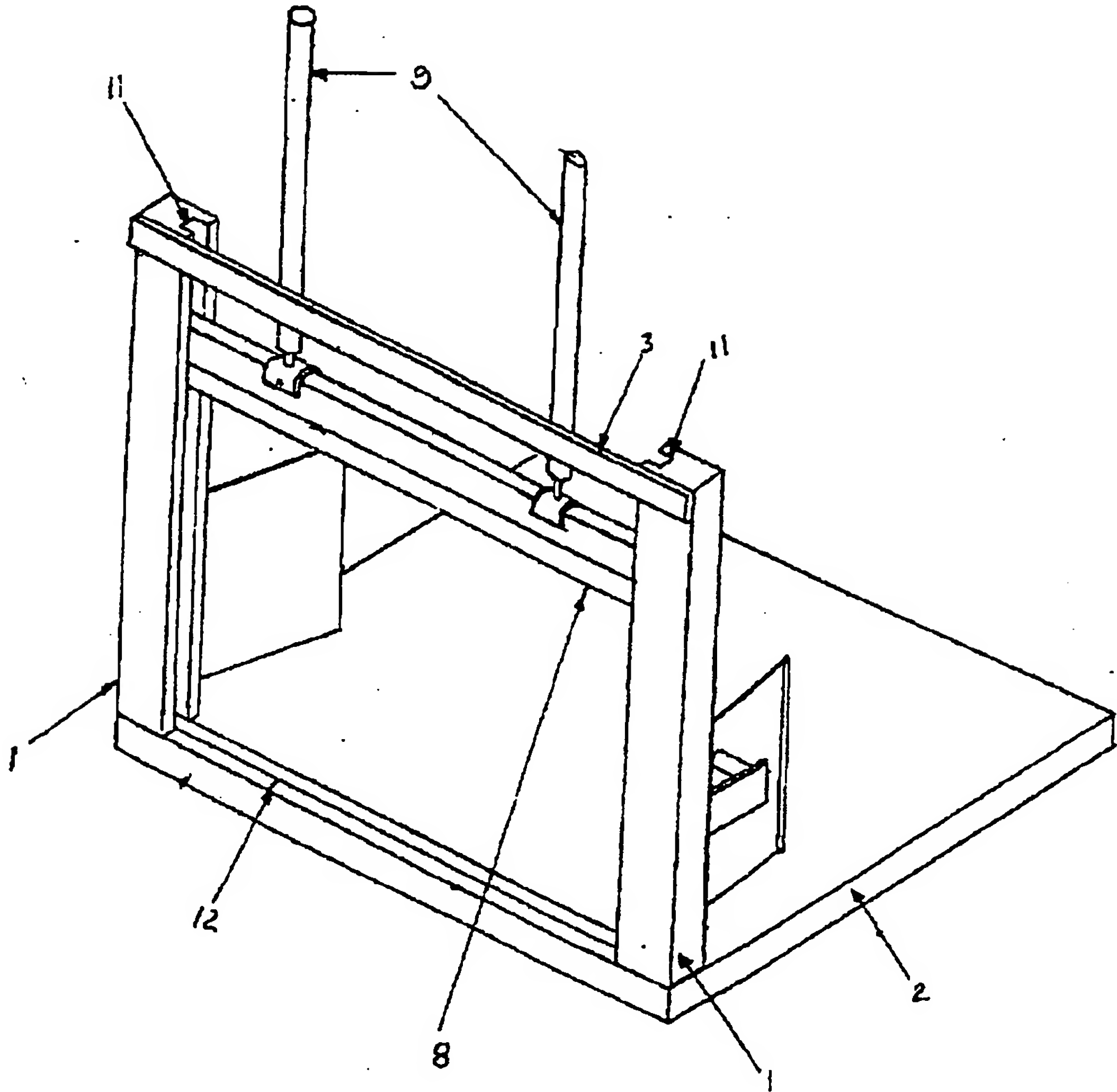
**LARGE SQUARE BALE CUTTER**

Van Hierden

**ABSTRACT:**

A device for cutting large square bales of crop material into smaller pieces for processing, comprising means for applying a compacting force to a portion of the bale to prevent deformation during cutting, a knife blade approximately as long as the bale, the blade having a flat side facing the compacted portion of the bale and a beveled side facing the uncompacted portion of the bale, the blade being mounted above the bale parallel to the axis of compaction and the strings on the bale, and means to force the knife blade down and through the bale.

FIGURE 1



This diagram shows an exploded perspective view of a window frame assembly. The components are labeled with numbers 1 through 20. The main frame consists of a top rail (1), a bottom rail (2), and two vertical stiles (3 and 4). A horizontal muntin (5) is positioned between the stiles. A sash is shown in an exploded position, consisting of a top rail (6), a bottom rail (7), and two vertical stiles (8 and 9). The sash is held together by a corner block (10) and a muntin (11). A weatherstripping strip (12) is shown along the bottom edge of the sash. A drainage channel (13) is located at the bottom of the frame. A sill (14) is shown at the base of the frame. A pane of glass (15) is shown in an exploded position between the sash and the frame. A sealant (16) is shown along the bottom edge of the frame. A drainage channel (17) is located at the bottom of the frame. A sill (18) is shown at the base of the frame. A pane of glass (19) is shown in an exploded position between the sash and the frame. A sealant (20) is shown along the bottom edge of the frame.

FIGURE 3

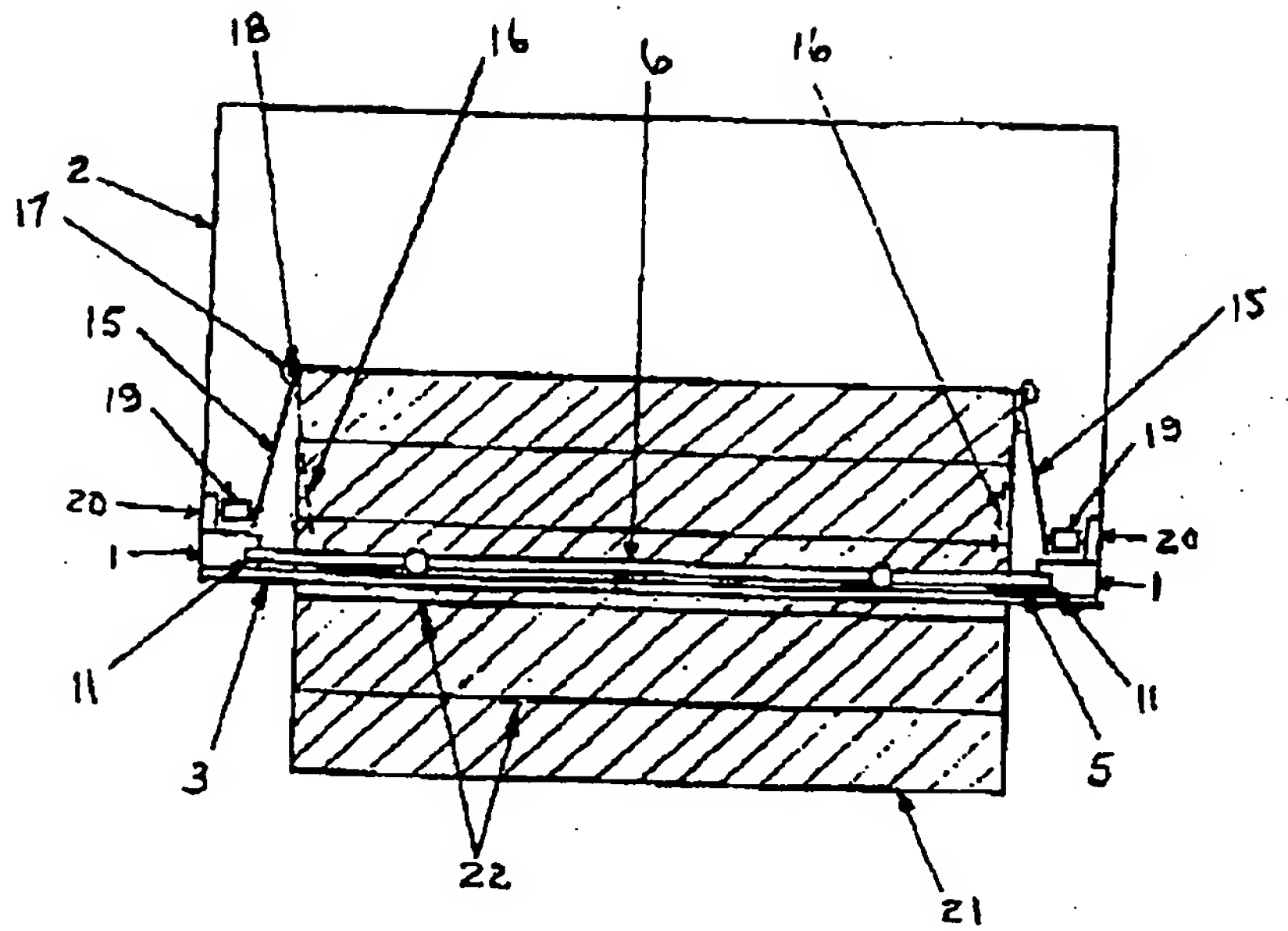


FIGURE 4

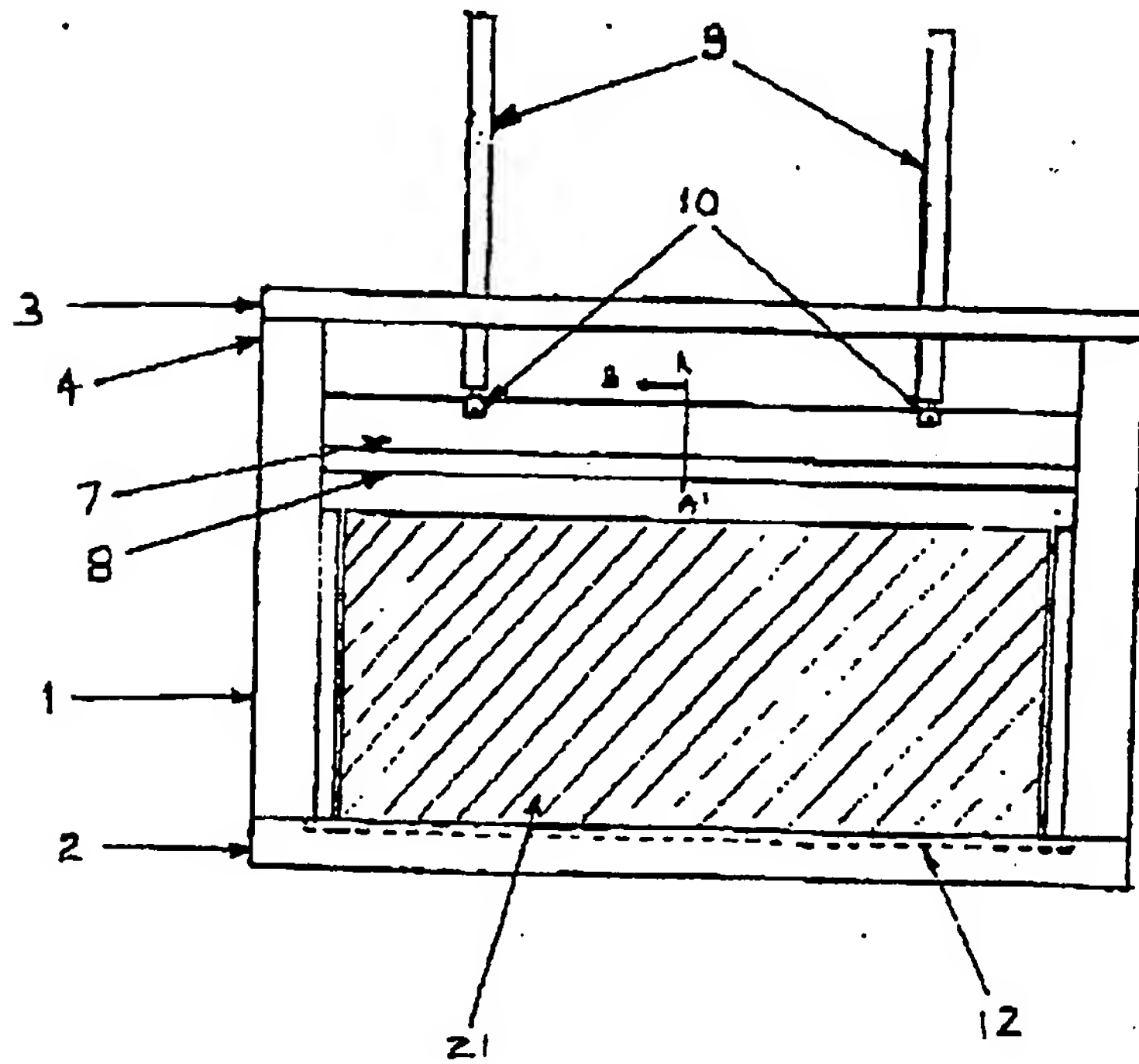
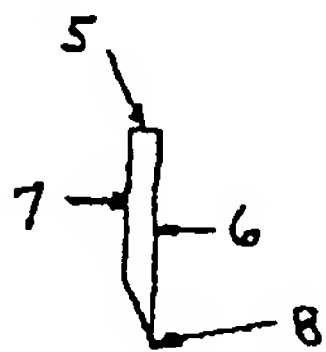
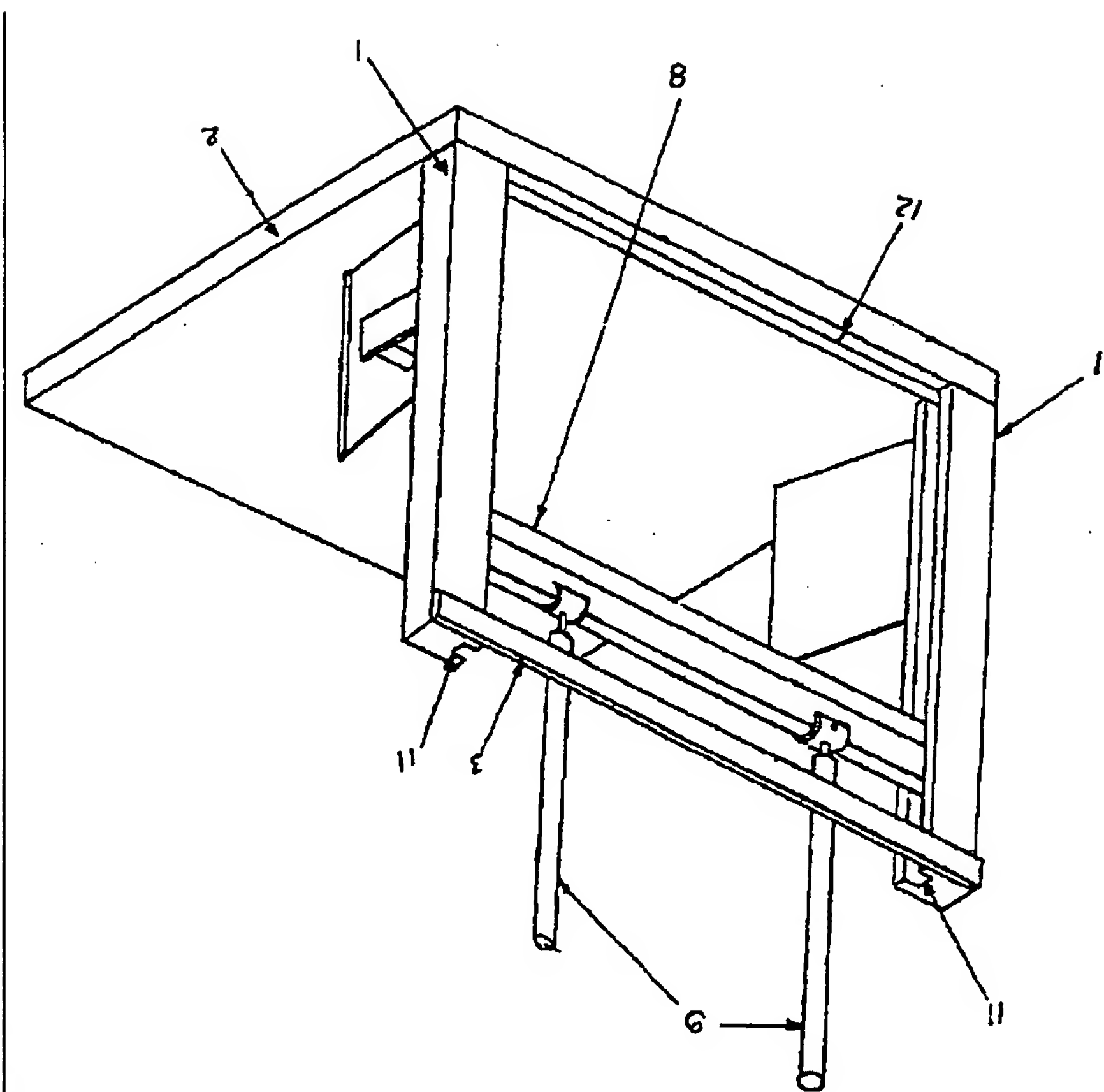


FIGURE 5







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